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(54) **Auger finger reversing mechanism.**

(57) A crop gathering attachment (1) for an agricultural harvester comprises :

- a rotatable auger-like conveyor (6) for transporting crop material,
- a stationary crank shaft mechanism (20) enclosed in the conveyor (6) and having a shaft portion (18) disposed eccentrically and parallel relative to the rotational axis of the conveyor (6); and
- a retractable finger arrangement (8) comprising a plurality of finger members (8) pivotally connected at their inner ends to said shaft portion (18) and projecting outwardly through guiding members (14) provided in the peripheral wall (10) of the conveyor (6); the arrangement be-

ing timed such that due to the eccentric disposition of the shaft portion (18), the finger members (8) are reciprocated relative to said conveyor wall (10) upon rotation of the conveyor (6), thereby protruding from said wall (10) at one side of the conveyor (6) for projecting into the crop material and being retracted relative to said wall (10) at the generally diametrically opposed side of said conveyor (6) for releasing the transported crop.

Actuator means (38) are operatively connected to the crank shaft mechanism (20) for remotely controlling the position of the shaft portion (18) relative to the conveyor (6) enabling on-the-go adjustments of the timing of the finger members (8).

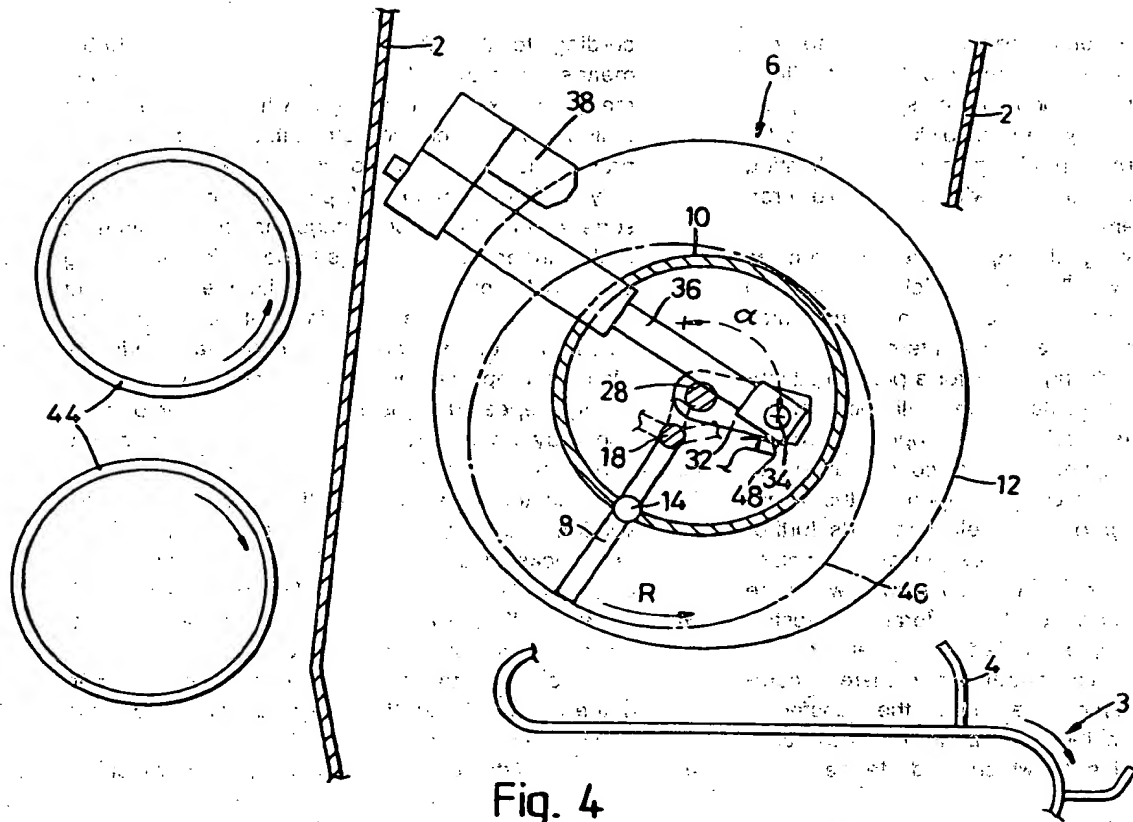


Fig. 4

The present invention relates generally to crop gathering attachments or headers for agricultural harvesting machines and more specifically, although not exclusively, to crop pick-up devices for forage harvesters comprising crop consolidating auger conveyors provided with retractable crop transporting fingers.

In the following description, terms such as "forward", "rearward", "left", "right", etc., are used, which are words of convenience and which are not to be construed as limiting terms.

A crop consolidating auger for a pick-up attachment conventionally extends the full width of the attachment and is provided with oppositely wound auger flights for gathering and consolidating the crop material in the central region of the auger from where the crop is propelled towards further crop transporting and/or processing means including e.g. feed rolls or a comminuting rotor when the front attachment is coupled to a forage harvester. Retractable fingers, embodied in the auger conveyor at least in said central region thereof, commonly are employed to assist in the transfer of crop material from the pick-up device to the crop processing machine to which said device is attached.

Normally, such retractable fingers are carried on bearings which rotate on the eccentric part of a crank shaft mechanism which is provided coaxially with the rotational axis of the auger conveyor; the timing of the arrangement being such that, during operation, the fingers are protruding from the auger body to their maximum possible extent when oriented to the crop collecting side (i.e. the front side) of the pick-up device whereas the fingers are fully retracted when directed to the crop releasing side thereof. In so doing, crop material lifted from the ground and presented to the consolidating auger, at least in the central portion thereof, aggressively is engaged by the protruding fingers and positively is entrained underneath the auger to be released by the retracting fingers at the rearward transitional area between the attachment and its carrier where other crop transporting and processing means are operable to take over the crop material.

The retractable finger construction so far described is conventional in the art and may be seen from a.o. US-A-2.701.634, the content of which is included herein by means of reference.

It has been experienced however that the just described finger timing position relative to the auger body is not always the best suited for all types of crops and crop conditions. Depending on e.g. the crop length, the moisture content or the degree of ripeness, different timing positions of the retractable fingers may be desirable in order to obtain a non-obstructed and fluent transfer of crop material across the auger device. In the arrangement ac-

cording to the above identified US-A-2.701.634, means are provided to turn the crank shaft around the pivot axis of the auger whereby a different timing position of the retractable fingers can be preset. However, the proposed embodiment offers only a limited range of positions and moreover suffers from the disadvantage that any adjustment of the finger orientation has to be performed during a standstill of the harvester with the attachment being totally inactive, meaning that the result of an adjusted finger setting is not immediately visible. Also, as crop conditions in a same field may vary widely, repeated adjustments of the finger orientation may be required leading to downtime of the harvester.

It is therefore the objective of the present invention to overcome the above mentioned drawbacks of the described prior art arrangement by providing a simple and effective device which allows on-the-go adjustment of the retractable finger orientation over a wide range of positions.

According to the present invention, a crop gathering attachment for an agricultural harvester is provided comprising :

- a rotatable drum-like conveyor for transporting crop material,
- a stationary crank shaft mechanism enclosed in the conveyor and having eccentric means disposed eccentrically to and parallel with the rotational axis of the conveyor; and
- a finger arrangement comprising a plurality of finger members operatively connected to said eccentric means and projecting outwardly through apertures in the peripheral wall of the conveyor to a different extent; the arrangement being timed such that due to the eccentric disposition of the eccentric means relative to the rotational axis of the conveyor, the finger members are reciprocated relative to said conveyor wall upon rotation of the conveyor, thereby protruding from said wall at one side of the conveyor for projecting into the crop material and being retracted relative to said wall at the generally diametrically opposed side of said conveyor for releasing the transported crop.

The attachment is characterized in that actuator means are operatively connected to the crank shaft mechanism for remotely controlling the position of the eccentric means relative to the conveyor enabling on-the-go adjustments of the timing of the finger members.

The actuator means preferably are of the electrical type and, when actuated, are operable to vary the relative position of the eccentric means with respect to the conveyor through a range of positions for shifting the maximum extended position of the finger members along the periphery of the

conveyor.

Related to another aspect of the present invention, it occasionally is experienced that the crop gathering attachment or even the harvester itself becomes plugged e.g. due to a lump of crop material wedging between crop handling parts thereby preventing the normal operation thereof even to the extent of arresting these parts. To obviate the need of manually unplugging the machine, nowadays harvesters commonly are provided with a drive reversing mechanism which allows for reversing the normal sense of rotation of the crop processing means in order to evacuate the obstructing crop towards the front of the harvester i.e. in a direction opposite to the crop flow during normal operation. However, in the transitional area between the harvester base unit and its front attachment, no means are provided to positively assist in the evacuation of the crop since, in said area at the rearward side of the consolidating auger, the auger fingers are completely retracted in the auger body, which is the normal position for the fingers during forward drive of the auger for releasing the transported crop appropriately. As a result, manual interference of the operator for unplugging the harvester sometimes still is needed especially if the cause of the plugging is located in said transitional area.

It is therefore another objective of the present invention to obviate the need of manual interference of the harvester operator during unplugging of the harvester by providing means and a method which allow for the positive assistance in the unplugging operation of the auger fingers at the rearward side of the auger when reversing the drive direction thereof.

According to this second aspect of the present invention, a crop gathering attachment for an agricultural harvester is provided comprising:

- a rotatable drum-like conveyor operatively connected to a drive mechanism for driving the conveyor either in a first direction to transport crop material towards said harvester or in a second, reverse direction to expel plugged crop material from said harvester,
- a stationary crank shaft mechanism enclosed in the conveyor and having eccentric means disposed in a first position eccentrically to and parallel with the rotational axis of the conveyor; and
- a finger arrangement comprising a plurality of finger members operatively connected to said eccentric means and projecting outwardly through apertures in the peripheral wall of the conveyor to a different extent; the arrangement being timed such that due to the eccentric disposition of the eccentric means relative to the rotational axis of the conveyor, the

finger members are reciprocated relative to said conveyor wall upon rotation of the conveyor, thereby protruding from said wall at one side of the conveyor for projecting into the crop material and being retracted relative to said wall at the generally diametrically opposed side of said conveyor for releasing the transported crop.

The attachment is characterized in that actuator means are operatively connected to the crank shaft mechanism in a manner such that, upon reversing the drive of the drive mechanism from the first direction to the second direction and/or vice versa, the eccentric means is moved to a second position offset relative to the first position, and/or vice versa, to thereby substantially modify the timing of the finger members.

Still according to the second aspect of the present invention, a method of unplugging crop material from a crop gathering attachment for an agricultural harvester is provided; said attachment comprising:

- a rotatable drum-like conveyor operatively connected to a drive mechanism for driving the conveyor either in a first direction to transport crop material towards said harvester or in a second, reverse direction to expel plugged crop material from said harvester,
- a stationary crank shaft mechanism enclosed in the conveyor and having eccentric means disposed in a first position eccentrically to and parallel with the rotational axis of the conveyor; and
- a finger arrangement comprising a plurality of finger members operatively connected to said eccentric means and projecting outwardly through apertures in the peripheral wall of the conveyor to a different extent; the arrangement being timed such that due to the eccentric disposition of the eccentric means relative to the rotational axis of the conveyor, the finger members are reciprocated relative to said conveyor wall upon rotation of the conveyor, thereby protruding from said wall at one side of the conveyor for projecting into the crop material and being retracted relative to said wall at the generally diametrically opposed side of said conveyor for releasing the transported crop.

The method is characterized in that it comprises the steps of:

- reversing the drive of the drive mechanism from the first direction to the second direction;
- actuating actuator means, operatively connected to the crank shaft mechanism; and
- moving the eccentric means to a second position offset relative to the first position to

thereby substantially modify the timing of the finger members.

A crop gathering attachment in accordance with the different aspects of the present invention will now be described in greater detail, by way of example, with reference to the accompanying drawings, in which :

Figure 1 is a perspective view of a crop pick-up attachment for a forage harvester, comprising a consolidating auger with retractable fingers;

Figure 2 is a curtailed perspective view of a crop consolidating auger with parts of the exterior surface removed for showing the interior crank shaft mechanism which controls the position of the retractable fingers;

Figure 3 is a schematic side view of the pick-up attachment as seen from the right of Figure 1 in relation to the feed rolls of a forage harvester, the arrangement being shown in the forward operative drive condition;

Figure 4 is a view similar to Figure 3 but showing the arrangement in the reverse drive condition; and

Figure 5 shows an electrical wiring diagram for controlling the adjustment of the retractable auger fingers.

Referring now to Figure 1, a crop gathering attachment 1 for a forage harvester is shown comprising a frame 2, a conventional pick-up device 3 with rotatable tines 4 for lifting the crop from the ground, a so called "wind guard" 5 for restricting upward movement of the crop and a crop consolidating auger 6 having retractable fingers 8; the auger 6 being operable to convey the crop through a central opening 9 in the rear side of the frame 2 towards further processing means, such as feed rolls 44 (shown in Figures 3 and 4) of a forage harvester (not shown).

Turning now to Figures 1 and 2, the auger 6 includes a tubular body portion 10 which carries oppositely wound, auger-like conveyor flights 12 at each end which consolidate the gathered crop at a central region of the auger 6 upon rotation thereof. The retractable fingers 8 are disposed at said central portion of the auger 6 and are operable to project into the gathered crop and propel it rearwardly towards the succeeding processing means of the harvester.

The fingers 8 are rod-shaped members slidably fitted through guide members 14 in the auger body 10 and are rotatably journaled by cylindrical bearings 16 to a finger shaft 18, forming part of a stationary crank shaft mechanism, generally indicated at 20. The fingers 8 may be provided in equiangularly spaced rows (as seen in Figure 1) or may be staggered uniformly about the periphery of the auger body 10 (as seen in Figure 2). The finger shaft 18 is eccentrically disposed in the auger

body 10 on a pair of crank arms 22 and 23. The crank arm 22 is secured to a stub shaft 24 which is anchored by a bearing in a wall plate 26 mounted solidly within the auger tube 10. The other crank arm 23 is secured to an elongated shaft 28 which passes through a bearing in a second wall plate 30, equally solidly provided in the auger body 10. The shaft 28 extends to the right hand side of the attachment 1, as seen in the direction of forward travel, where it is anchored against rotation to the frame 2. As the stub shaft 24 and the shaft 28 are in line with each other and moreover are disposed coaxially relative to the rotational axis of the auger 6, the crank shaft mechanism 20 remains fixed with relation to the attachment frame 2 when the auger 6 is rotated.

Accordingly, as the auger 6 rotates in the direction of the arrow F, the fingers 8 are rotated about the finger shaft 18 and are reciprocated in the guide members 14 due to the eccentricity of the finger shaft 18 with respect to the auger body 10. The arrangement is timed so that, upon rotation of the auger 6, the fingers 8 extend and project forwardly into the crop material delivered by the pick-up device 3, sweeping the crop under the auger 6, and then retract within the body of the auger 6 in order to assist in releasing the crop material for facilitating the takeover thereof by the feed rolls 44.

As the arrangement of the parts and the mode of operation so far described is conventional in the art, it furthermore will be appreciated that the right hand side of the auger 6 is rotatably supported on the shaft 28 whereas the left hand side thereof is provided with a stub shaft (not shown) coupled to a suitable drive mechanism (equally not shown) for rotating the auger 6 during the harvesting operation.

As best seen in Figure 3, the free end of the shaft 28 is fixedly secured to a crank arm 32, the distal end of which is attached at 34 to a rod 36 of an electrical actuator 38. It readily will be appreciated that different settings of the crank arm 32, through the shaft 28 and its interior crank arm 23, result in different positions of the finger arm 18 relative to the auger body 10. The disposition of the parts as shown in Figure 3 corresponds to the timing of the retractable fingers 8 during normal operative conditions wherein said fingers 8 are protruding from the auger body 10 when directed to the crop receiving side of the attachment 1 and are retracted within the auger body 10, at the diametrically opposed side thereof. The cylindrical outline generated by the fingers 8 when driven in the direction of arrow F is schematically represented by the dashed line 40. A limit switch 42, adjustably supported on the frame 2, is operable to restrict the retractive stroke of the actuator rod 36

by cutting the current to the actuator motor when the switch 42 becomes engaged by the crank arm 32. In so doing, retractive movement of the actuator 38 beyond a workable position is prevented.

A three-position switch provided in the operator's cab (not shown) allows for a remotely controlled energizing of the actuator 38 in the one or other direction thereby changing the relative position of the finger shaft 18 and as such enabling on-the-go adjustments of the timing of the retractable fingers 8 whenever required by changing crop conditions.

The arrangement as shown in Figure 4 corresponds to the situation in which an unplugging of the harvester is taken place. It will be seen that the drive direction of the feed rolls 44 and the pick-up device 3 is reversed, as well as the drive direction of the auger 6, which is indicated by the arrow R. When comparing Figure 4 with Figure 3, it will be noticed that the rod 36 of the actuator 38 has been extended to a degree for effecting the anchoring point 34 to the crank arm 32 being swung over an arc α , resulting in the finger shaft 18 equally being rotated in a clockwise direction, as seen in Figure 4, over the same arc α . As a consequence, the outline 46 described by the fingers 8 is shifted considerably to the lower rear side of the auger 6 meaning that the fingers 8 now are extended in said area so that they positively can assist in the removal of plugged crop material in the transitional area between the feed rolls 44 and the auger 6. A limit switch 48 again is operable to define the maximum extended position of the actuator rod 36.

It will be clear that although in the depicted arrangement the arc α is approximately 120° , the position of the limit switches 42 and 48 may be varied so as to obtain either a smaller or a larger angle, respectively reducing or increasing the stroke of the actuator 38. By providing a suitable link arrangement between the actuator 38 and the crank arm 32, angles of 180° and even more are obtainable so that the finger shaft 18 can be set in diametrically opposed working positions.

In an alternative arrangement (not shown), the limit switches 42 and 48 are replaced by adjustable potentiometers which are built in into the actuator 38 and which are operable to directly define and restrict the working stroke of the actuator rod 36.

As already mentioned above, the timing of the retractable fingers 8 is remotely controlled by a three-position switch provided in the operators cab, allowing for an infinite adjustment of the arrangement on-the-go. However, for unplugging purposes, an infinite adjustment of the finger timing is not really required as the fingers 8 anyhow have to be shifted to their extreme reversed position. In order to obviate the need for the operator to first bring the fingers 8 in their rearwardly extended position

and then thereafter command the drive reversal of the crop intake components, such as the auger 6, for starting an unplugging operation, it is proposed in Figure 5 to provide an additional switch 50 in the operators cab which as well controls the setting of the auger fingers 8 in either one of their extreme positions as the drive reversal of the crop gathering and transporting parts. The electrical diagram of Figure 5 basically comprises and schematically shows the switch 50, two relays 52, the actuator 38 and a drive reversing motor 54. In the full line position of switch 50, which corresponds to the full line position of the relays 52, the actuator is energized through line 56 whereas the drive reversing motor 54 is energized through line 58. In order to reverse, the switch 50 is switched over to its dashed line position, hereby attracting the relays 52, and energizing lines 60 and 62 so as to reverse the operation of as well the actuator 38 as of the motor 54.

It will be clear from the foregoing that the switch 50 simultaneously initiates both the retractable finger timing as the drive reversal. The limit switches 42 and 48 again are employed to switch off the current to the actuator 38 when reaching an end-of-stroke position while, at that instant, the drive motor 54 continues its operation. The relation between the mentioned three-position switch and the switch 50 is such that the former may override the operation of the latter, meaning that even during an unplugging operation, the finger timing still may be adjusted at wish.

In an alternative arrangement, the electrical diagram of Figure 5 may be rearranged such that actuation of the switch 50 allows the fingers 8 to reverse completely before the drive reversal of the motor 54 is initiated. The foregoing ensures that the retractable fingers 8 have reached their optimum working position before the actual drive reversal takes place, resulting in an immediate impact of the fingers 8 on the unplugging operation.

Although the present invention mainly has been described in connection with a pick-up device for a forage harvester, it will be appreciated that the invention should not be limited thereto but can be employed on any kind of crop gathering or harvesting attachment and/or header using a drum-like conveyor with retractable fingers. As an example, combine harvesters conventionally employ a header assembly comprising a.o. a sickle bar for severing the crop from the stubble and a crop consolidating auger provided with retractable fingers for assisting in the transfer of the crop towards a straw elevator and from there onwards to the threshing mechanism of the combine. In this application, the correct timing of the retractable fingers is also essential and the need of reversing the drive of the gathering components for unplugging purposes oc-

asionally is present as well. In other words, the reversing mechanism for the retractable fingers would be welcomed. The same is equally true for pick-up arrangements of agricultural balers also using crop conveying augers with retractable fingers.

Claims

1. A crop gathering attachment (1) for an agricultural harvester comprising :
 - a rotatable drum-like conveyor (6) for transporting crop material,
 - a stationary crank shaft mechanism (20) enclosed in the conveyor (6) and having eccentric means (18) disposed eccentrically to and parallel with the rotational axis of the conveyor (6); and
 - a finger arrangement (8) comprising a plurality of finger members (8) operatively connected to said eccentric means (18) and projecting outwardly through apertures in the peripheral wall (10) of the conveyor (6) to a different extent; the arrangement being timed such that due to the eccentric disposition of the eccentric means (18) relative to the rotational axis of the conveyor (6), the finger members (8) are reciprocated relative to said conveyor wall (10) upon rotation of the conveyor (6), thereby protruding from said wall (10) at one side of the conveyor (6) for projecting into the crop material and being retracted relative to said wall (10) at the generally diametrically opposed side of said conveyor (6) for releasing the transported crop; and
 characterized in that
 actuator means (38) are operatively connected to the crank shaft mechanism (20) for remotely controlling the position of the eccentric means (18) relative to the conveyor (6) enabling on-the-go adjustments of the timing of the finger members (8).
2. An attachment according to claim 1 characterized in that the crank shaft mechanism (20) further comprises :
 - a shaft member (28) provided generally coaxially with the rotational axis of the conveyor (6) and connected at one end to the eccentric means (18) by means of a crank arm (23); and
 - a lever member (32) fixedly secured at one end to the distal end of said shaft member (28) and rotatably connected at the opposed end thereof to the actuator means (38).
3. An attachment according to claim 2 characterized in that by actuating the actuator means (38), the lever member (32) is moved through a range of positions thereby varying the relative position of the eccentric means (18) with respect to the conveyor (6) for shifting the maximum extended position of the finger members (8) along the periphery of the conveyor (6).
4. An attachment according to any of the preceding claims characterized in that the actuator means (38) is of the electrical type and is remotely controllable through a three-position switch enabling adjustments of the finger members timing in the one or other direction.
5. An attachment according to any of the claims 1 to 4 characterized in that the actuator means (38) comprises a double-acting hydraulic cylinder (-) enabling adjustments of the finger members timing in the one or other direction.
6. An attachment according to any of the preceding claims characterized in that sensor means (42, 48) are operable to limit the operative stroke of the actuator means (38).
7. An attachment according to claim 6 when appended either directly or indirectly to claim 2, characterized in that said sensor means (42, 48) comprise a pair of limit switches (42, 48) operatively associated with the lever member (32) and adjustable relative thereto for selectively limiting the range of allowable positions of said member (32).
8. A crop gathering attachment (1) for an agricultural harvester comprising :
 - a rotatable drum-like conveyor (6) operatively connected to a drive mechanism (54) for driving the conveyor (6) either in a first direction to transport crop material towards said harvester or in a second, reverse direction to expel plugged crop material from said harvester,
 - a stationary crank shaft mechanism (20) enclosed in the conveyor (6) and having eccentric means (18) disposed in a first position eccentrically to and parallel with the rotational axis of the conveyor (6); and
 - a finger arrangement (8) comprising a plurality of finger members (8) operatively connected to said eccentric means (18) and projecting outwardly through apertures in the peripheral wall (10) of the conveyor (6) to a different extent; the

arrangement being timed such that due to the eccentrical disposition of the eccentric means (18) relative to the rotational axis of the conveyor (6), the finger members (8) are reciprocated relative to said conveyor wall (10) upon rotation of the conveyor (6), thereby protruding from said wall (10) at one side of the conveyor (6) for projecting into the crop material and being retracted relative to said wall (10) at the generally diametrically opposed side of said conveyor (6) for releasing the transported crop; and

characterized in that

actuator means (38) are operatively connected to the crank shaft mechanism (20) in a manner such that, upon reversing the drive of the drive mechanism (54) from the first direction to the second direction and/or vice versa, the eccentric means (18) is moved to a second position offset relative to the first position, and/or vice versa, to thereby substantially modify the timing of the finger members (8).

9. An attachment according to claim 8 characterized in that the modification of the timing of the finger members (8) is effected simultaneously with the reversal of the drive direction of the conveyor (6).

10. An attachment according to claim 9 characterized in that a single switch (50) is operatively associated with the drive mechanism (54) on the one hand and the actuator means (38) on the other hand for actuating both at the same time.

11. An attachment according to claim 8 characterized in that the drive mechanism (54) and the actuator means (38) are electrically linked in a manner such that, upon initiating an unplugging operation and before reversing the drive direction of the drive mechanism (54), the actuator means (38) first move the eccentric means (18) completely to its second, offset position.

12. An attachment according to any of the claims 8 to 11 characterized in that the conveyor (6) cooperates with crop transporting and/or processing means (44) disposed rearwardly thereof as seen in the direction of normal crop flow through the harvester thereby defining a transitional area inbetween; the arrangement being such that in the maximum extended position of the finger members (8), corresponding to the second, offset position of the eccentric means (18), said finger members (8) extend in said

transitional area.

13. An attachment according to any of the claims 8 to 12 characterized in that the crank shaft mechanism (20) further comprises:

- a shaft member (28) provided generally coaxially with the rotational axis of the conveyor (6) and connected at one end to the eccentric means (18) by means of a crank arm (23); and
- a lever member (32) fixedly secured at one end to the distal end of said shaft member (28) and rotatably connected at the opposed end thereof to the actuator means (38).

14. An attachment according to claim 13 characterized in that, by actuating the actuator means (38), the lever member (32) is uninterruptedly moved from a first position corresponding to the first position of the eccentric means (18) to a second position corresponding to the second position of the eccentric means (18) or vice versa for shifting the maximum extended position of the finger members (8) along the periphery of the conveyor (6).

15. An attachment according to any of the claims 8 to 14 characterized in that sensor means (42, 48) are operable to limit the operative stroke of the actuator means (38).

16. An attachment according to claim 15 when appended to claim 14, characterized in that said sensor means (42, 48) comprise a pair of limit switches (42, 48) operatively associated with the lever member (32) and adjustable relative thereto for selectively predetermining the first and second position of said lever member (32).

17. A method of unplugging crop material from a crop gathering attachment (1) for an agricultural harvester; said attachment (1) comprising:

- a rotatable drum-like conveyor (6) operatively connected to a drive mechanism (54) for driving the conveyor (6) either in a first direction to transport crop material towards said harvester or in a second, reverse direction to expel plugged crop material from said harvester;
- a stationary crank shaft mechanism (20) enclosed in the conveyor (6) and having eccentric means (18) disposed in a first position eccentrically to and parallel with the rotational axis of the conveyor (6); and

- a finger arrangement (8) comprising a plurality of finger members (8) operatively connected to said eccentric means (18) and projecting outwardly through apertures in the peripheral wall (10) of the conveyor (6) to a different extent; the arrangement being timed such that due to the eccentric disposition of the eccentric means (18) relative to the rotational axis of the conveyor (6), the finger members (8) are reciprocated relative to said conveyor wall (10) upon rotation of the conveyor (6), thereby protruding from said wall (10) at one side of the conveyor (6) for projecting into the crop material and being retracted relative to said wall (10) at the generally diametrically opposed side of said conveyor (6) for releasing the transported crop; and

said method being characterized in that it comprises the steps of:

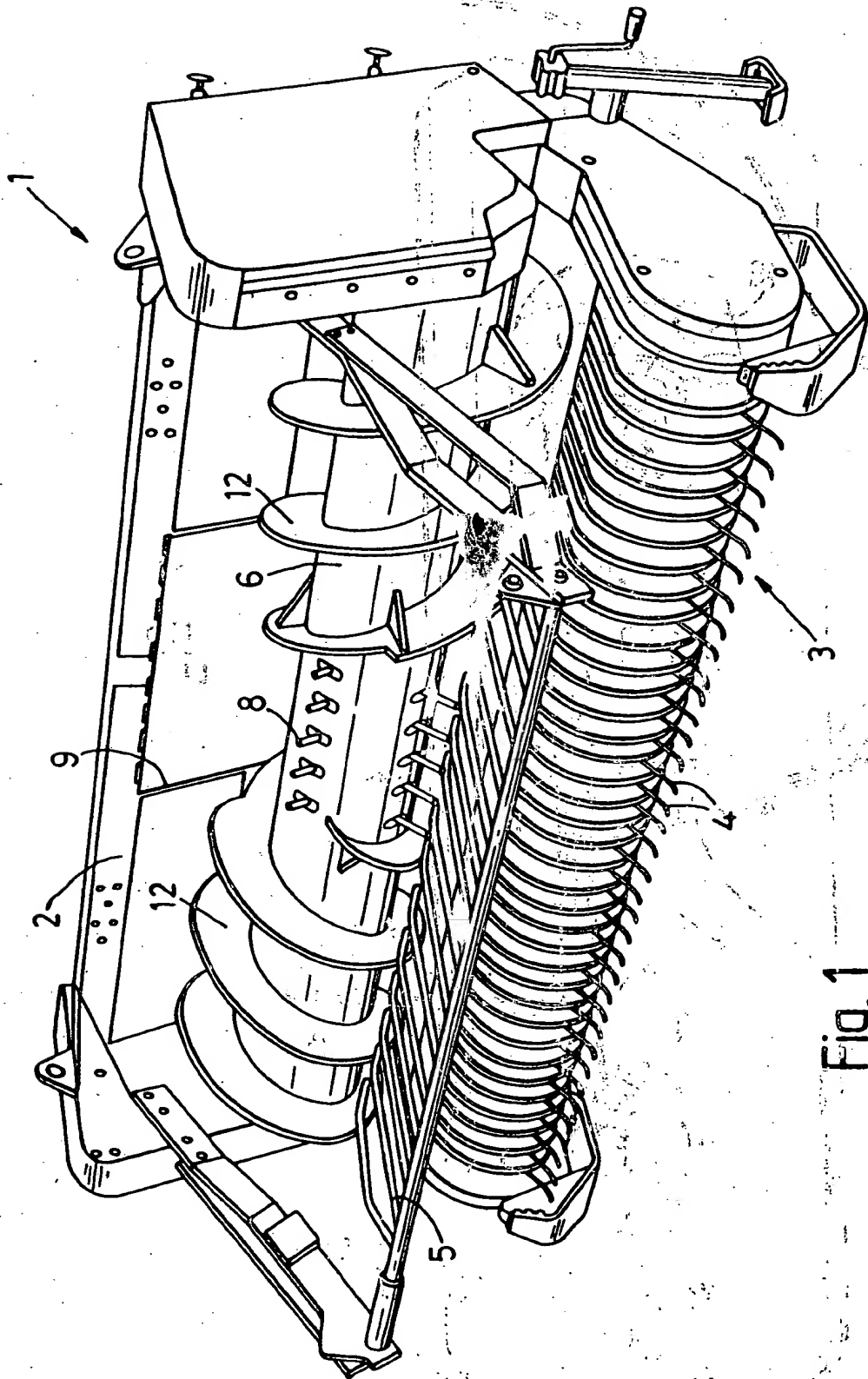
- reversing the drive of the drive mechanism (54) from the first direction to the second direction;
- actuating actuator means (38), operatively connected to the crank-shaft mechanism (20); and
- moving the eccentric means (18) to a second position offset relative to the first position to thereby substantially modify the timing of the finger members (8).

18. A method according to claim 17 characterized in that the reversing step, the actuating step and the moving step are effected simultaneously.

19. A method according to claim 18 characterized in that the actuating step and the moving step are completed before the reversing step is initiated.

20. A method according to any of the claims 17 to 19 characterized in that it further comprises the step of once-only actuating a single switch (50) for initiating both the reversing step and the actuating step.

21. A method according to any of the claims 17 to 20 characterized in that it further comprises the step of extending the finger members (8) to their maximum possible extent in a transitional area defined between the conveyor (6) and cooperating crop transporting and/or processing means (44) disposed rearwardly of said conveyor (6) as seen in the direction of normal crop flow through the harvester.



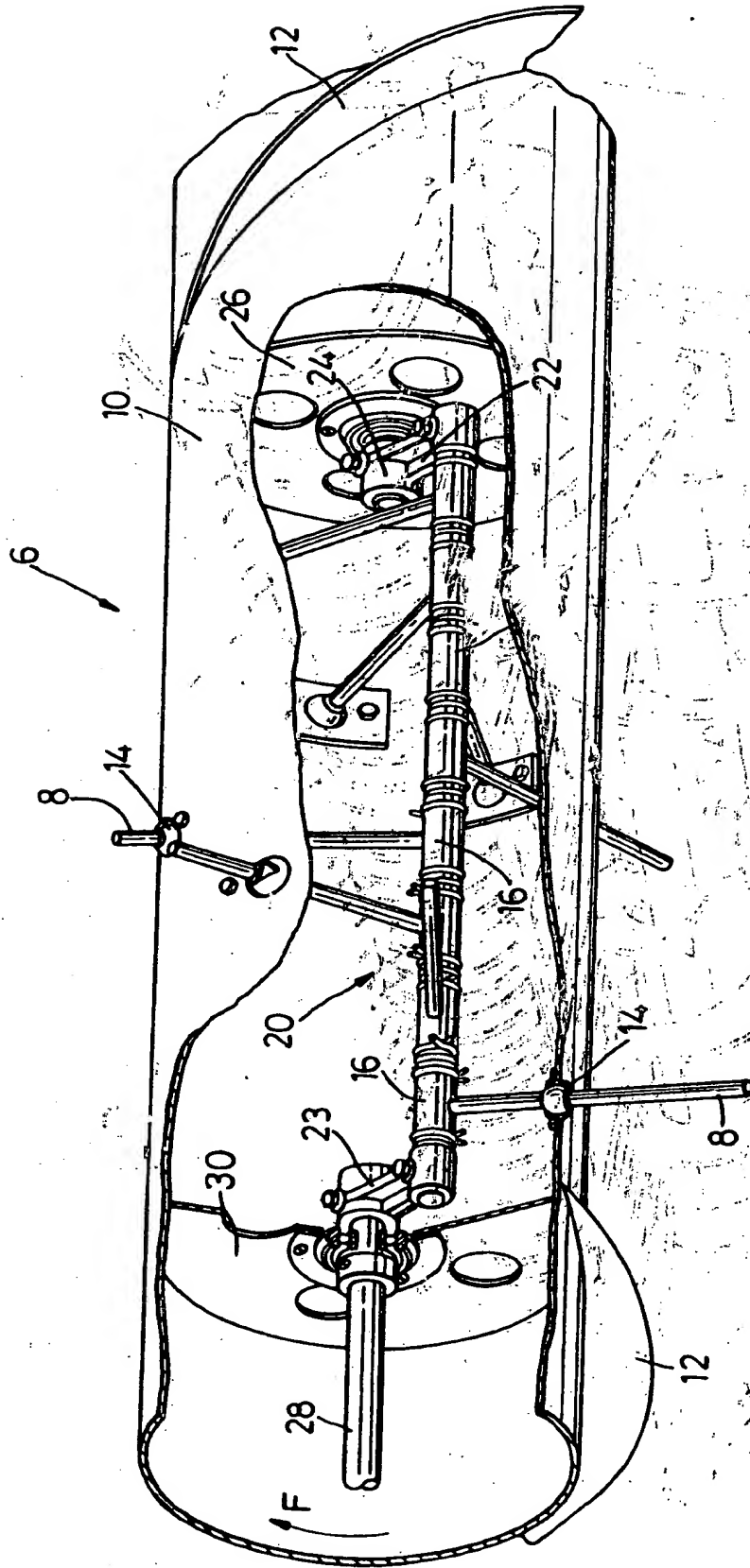


Fig. 2

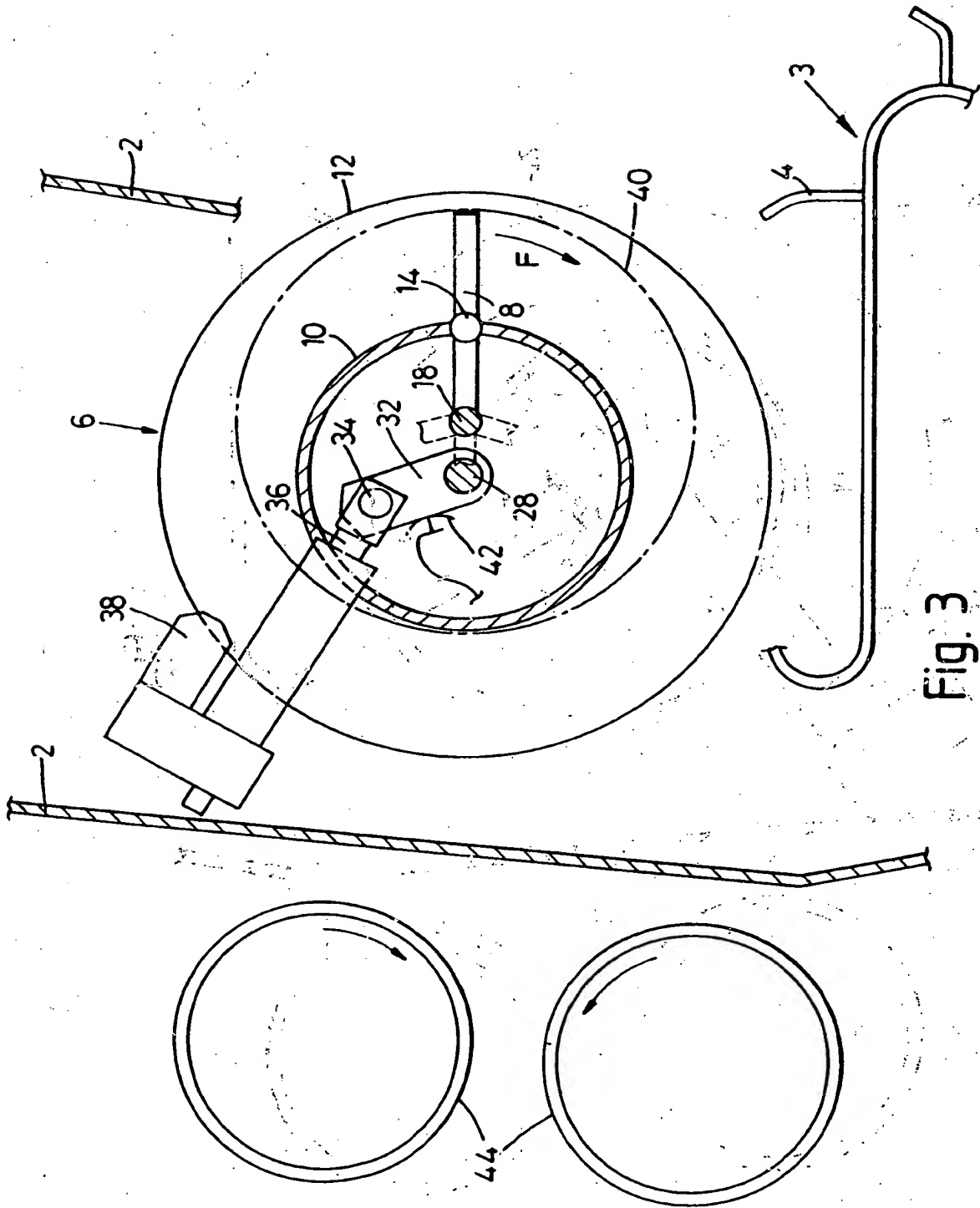
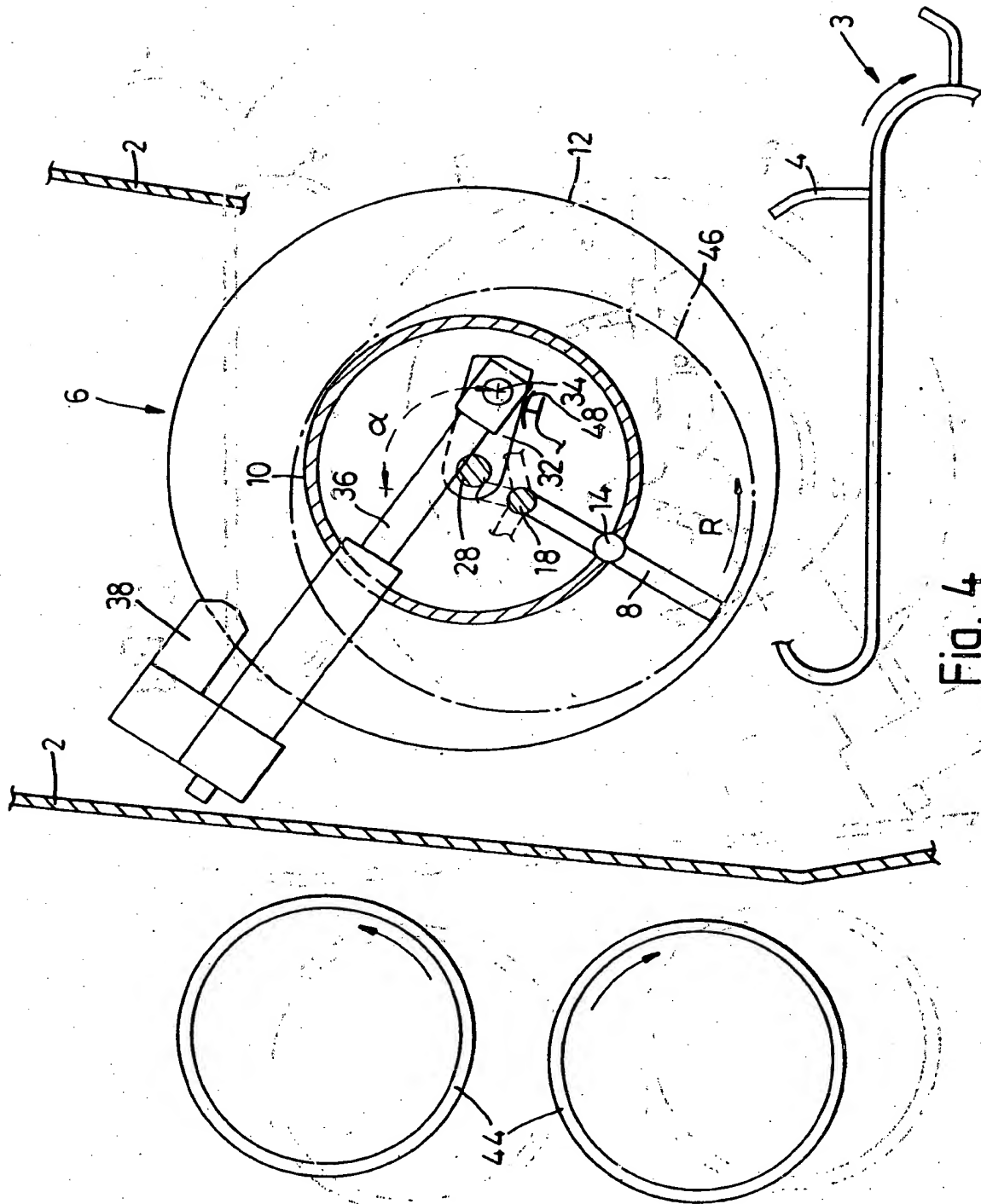


Fig. 3



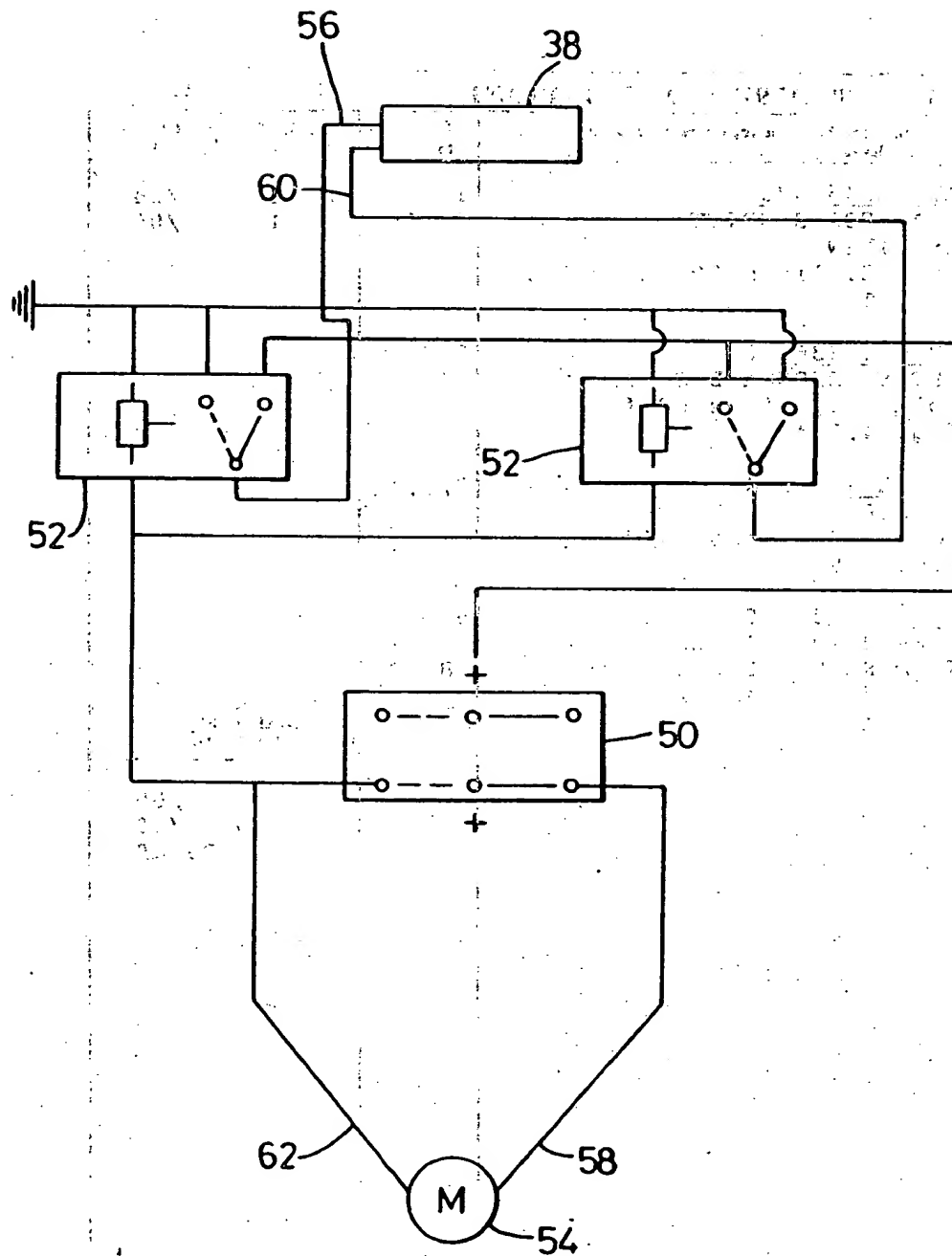


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93201129.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.5)
X	DD - A1 - 246 470 (KOMBINAT FORTSCHRITT LANDMASCHINEN) * Page 2, lines 12-14, 41ff; fig. 1,2 *	1,2,3, 14,15	A 01 D 41/14 A 01 D 61/00
A	EP - A2 - 0 236 106 (MC CARTHY, BERNHARD JUSTIN) * Column 4, lines 63ff; fig. 4,5 *	1,2,3, 14	
D,A	US - A - 2 701 634 (T. CARROLL) * Column 2, lines 27ff; fig. 1,5 *	2,3,14	
A	DD - A1 - 3 336 603 (KLOCKNER-HUMBOLDT-DEUTZ AG ZWEIGNIEDERLASSUNG FAHR) * Page 7, lines 23ff; fig. 3 *	5,7,8, 11,12, 18,19, 21	
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			A 01 D 41/00 A 01 D 61/00 A 01 D 89/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 03-06-1993	Examiner SCHNEEMANN
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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